

WHAT IS CLAIMED IS:

1 1. A substrate processing system comprising:
2 a deposition chamber comprising a reaction zone;
3 a substrate holder that positions a substrate in the reaction zone;
4 said substrate holder comprising a first RF electrode;
5 a gas distribution system includes a gas inlet manifold for supplying
6 one or more process gases to said reaction zone;
7 said gas inlet manifold comprising a second RF electrode;
8 a plasma power source for forming a plasma within the reaction zone
9 of said deposition chamber; and
10 an impedance monitor electrically coupled to the deposition chamber to
11 measure an impedance level of said plasma.

1 2. The substrate processing system of claim 1 wherein said
2 substrate holder comprises a first RF electrode, and wherein said gas distribution
3 system includes a gas inlet manifold that comprises a second RF electrode.

1 3. The substrate processing system of claim 1 further comprising
2 a computer processor communicatively coupled to said impedance monitor so that
3 said computer processor receives as an input the measured impedance level of said
4 plasma.

1 4. The substrate processing system of claim 3 further comprising
2 a variable capacitor electrically coupled to said chamber and controllably coupled to
3 said processor wherein said processor adjusts a capacitance level of said variable
4 capacitor to vary the impedance of said plasma in response to the measured
5 impedance level of said plasma.

1 5. The substrate processing system of claim 3 further comprising
2 a pressure control system configured to control a pressure level within said chamber

3 and controllably coupled to said processor wherein said processor controls said
4 pressure control system to vary the pressure within the chamber in response to the
5 measured impedance level of said plasma.

3 introducing one or more process gases into a reaction zone of the
4 substrate processing chamber;

5 forming a plasma from said one or more process gases;

6 maintaining the reaction zone at deposition conditions suitable to
7 deposit a layer from said one or more process gases;

8 measuring an impedance level of said plasma; and
9 adjusting deposition conditions in the reaction zone in response to said
0 measured impedance level.

- 3 processor and the step of adjusting said deposition conditions in the reaction zone is
- 4 controlled by said computer processor.

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